PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Ted E. Dunning, et al.	Examiner:	Yehdega Retta
Serial No.	09/846,823	Group Art Unit:	3622
Filed:	April 30, 2001	Docket No.	085804-014501
Title:	RELATIONSHIP DISCOVERY ENGINE		
Customer No.:	76058		

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APPEAL BRIEF

Date: August 19, 2009

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 C.F.R. § 41.37, Appellants respectfully submit the following Appeal Brief, which is being filed with a Notice of Appeal, in response to the Office Action dated May 27, 2009, which was made final.

The Commissioner is authorized to charge the amounts to Deposit Account No. 50-1561 to cover the fees under 37 C.F.R. § 41.20(b)(1) and (2). Any deficiency in or overpayment of this fee should likewise be charged or credited to Deposit Account No. 50-1561.

The following items are presented under the headings listed, and in the order prescribed, in 37 C.F.R. § 41.37(c)(l).

37 C.F.R. § 41.37(c)(l)(i): REAL PARTY IN INTEREST

Yahoo! Inc., the assignee of the entire interest of the above-identified application (as evidenced by Assignment documents recorded on July 26, 2008, at Reel 018005, Frame 0153), is the real party in interest in this appeal.

37 C.F.R. § 41.37(c)(l)(ii): RELATED APPEALS AND INTERFERENCES

An appeal was filed in U.S. Appl. Ser. No. 10/401,940, filed on March 26, 2003, which is a continuation of the present application. An appeal brief was filed on December 22, 2008, an Examiner's Answer was mailed April 3, 2009, and a reply brief was filed on June 3, 2009. The Patent Office's PAIR system shows the status for U.S. Appl. Ser. No. 10/401,940 as "Appeal Awaiting BPAI Docketing."

37 C.F.R. § 41.37(c)(l)(iii): STATUS OF CLAIMS

Claims 1-97 are pending in the application. In the Office Action dated May 27, 2009 (referred to herein as the "Office Action"), Claims 1-97 were rejected. Claims 1-97 remain under final rejection and are the subject of this appeal.

37 C.F.R. § 41.37(c)(l)(iv): STATUS OF AMENDMENTS

No amendments have been filed subsequent to the issuance of the Office Action.

37 C.F.R. § 41.37(c)(l)(v): SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1, 34, 39, 59 and 93 are independent. A concise explanation of the subject matter defined in each independent claim is given below. Page and line numbers in the specification are given herein as (Ppp.ll), where "P" indicates that a page/line reference follows, "pp" indicates the page number and "ll" indicates the line number. Drawing references are given herein as (Ddd.rr), where "D" indicates a drawing reference follows, "dd" indicates a drawing, or figure, number and "rr" indicates a reference character.

1. Claim 1

A computer-implemented method of discovering relationships between items, (P1.11-P1.15; P19.13-P19.16; P41.5-P46.5; P58.1-P67.15; D1A.1604; D3.302-D3.305; D4-D7; D14.1401-D14.1406; D15.1501-D15.1506) comprising:

accepting, in a computer, item selections detected from a plurality of users (P22.2-P22.10; P25.3-P25.5; P27.16-P28.3; P29.14-P29.21; P31.13-P31.19; P33.11-P33.13; P39.13-P40.2; P72.5-P87.15; D1A.103; D12, D17-D20);

generating, in the computer, a log for each user, each log containing identifiers corresponding to detected user item selections (P27.4-P28.12; P34.1-P34.8; P34.11-P34.13; P39.15-P39.16; P41.7-P41.8; P43.1-P43.5; P48.17-P49.7; P57.6-P57.7; D1A.114; D9.901; D9.902; D9.903);

accepting, in the computer, a query including at least one query item identifier (P24.19-P25.3; P41.1-P41.4; P58.6-P58.9; P59.8-P59.9; D2.213; D14.1402);

scoring, in the computer, each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item (P31.14-P31.19; P62.1-P63.16; P64.4-P64.16; D1A.1604);

determining, in the computer, at least one result item, responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item (P31.14-P32.12; P34.11-P34.12; P41.5-P41.19; P42.16-P46.5; P59.1-P59.6).

2. Claim 34

Claim 34 is directed to a computer-implemented method of discovering a relationship between a first item and a second item, (P1.11-P1.15; P19.13-P19.16; P41.5-P46.5; P58.1-P67.15; D1A.1604; D3.302-D3.305; D4-D7; D14.1401-D14.1406; D15.1501-D15.1506) comprising:

determining, in the computer, a total number of item groups N (P60.12);

determining, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item (P60.13);

determining, in the computer, a number of item groups N_2 not in the subset of item groups (P60.14);

determining, in the computer, a number of item groups k_{11} in the subset that contain the first item (P60.15);

determining, in the computer, a number of item groups k_{12} not in the subset that contain the first item (P60.16-P60.17);

determining, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item (P60.18-P60.19);

determining, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item (P60.20-P60.21);

determining, in the computer, a log likelihood ratio (P61.1-P61.4); and

generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second (P59.10-P59.17).

3. Claim 39

Claim 39 is directed to a system for discovering relationships among items, (P1.11-P1.15; P19.13-P19.16; P41.5-P46.5; P58.1-P67.15; D1A.1604; D3.302-D3.305; D4-D7; D14.1401-D14.1406; D15.1501-D15.1506) comprising:

a user interface for accepting item selections from a plurality of users (P22.2-P22.10; P25.3-P25.5; P27.16-P28.3; P29.14-P29.21; P31.13-P31.19; P33.11-P33.13; P39.13-P40.2; P72.5-P87.15; D1A.103; D12, D17-D20);

at least one log database, coupled to the user interface, for storing a log for each user, each log containing identifiers corresponding to detected user item selections (P27.4-P28.12; P34.1-P34.8; P34.11.13; P39.15-P39.16; P41.7-P41.8; P43.1-P43.5; P48.17-P49.7; P57.6-P57.7; D1A.114; D9.901; D9.902; D9.903);

a query input device for accepting a query including at least one query item identifier (P24.19-P25.3; P41.1-P41.4; P58.6-P58.9; P59.8-P59.9; D2.213; D14.1402); and

a relationship discovery engine, coupled to the log database and to the query input device, for scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and for determining at least one result item, responsive to the scoring of each user log, so as to discover a relationship based exclusively on detected user item selections and the at least one query item (P31.14-P32.19; P34.11-P34.12; P41.5-P41.19; P42.16-P46.5; P59.1-P59.6; P62.1-P63.16; P64.4-P64.16; D1A.1604).

4. Claim 59

Claim 59 is directed to a computer-readable medium comprising computer-readable code for discovering relationships between items, (P1.11-P1.15; P19.13-P19.16; P41.5-P46.5; P58.1-P67.15; D1A.1604; D3.302-D3.305; D4-D7; D14.1401-D14.1406; D15.1501-D15.1506) comprising:

computer-readable code adapted to accept item selections detected from a plurality of users (P22.2-P22.10; P25.3-P25.5; P27.16-P28.3; P29.14-P29.21; P31.13-P31.19; P33.11-P33.13; P39.13-P40.2; P72.5-P87.15; D1A.103; D12, D17-D20);

computer-readable code adapted to generate a log for each user, each log containing identifiers corresponding to detected user item selections (P27.4-P28.12; P34.1-P34.8; P34.11-P34.13; P39.15-P39.16; P41.7-P41.8; P43.1-P43.5; P48.17-P49.7; P57.6-P57.7; D1A.114; D9.901; D9.902; D9.903);

computer-readable code adapted to accept a query including at least one query item identifier (P24.19-P25.3; P41.1-P41.4; P58.6-P58.9; P59.8-P59.9; D2.213; D14.1402);

computer-readable code adapted to score each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item (P31.14-P31.19; P62.1-P63.16; P64.4-P64-19; P56.17; D1A.1604);

computer-readable code adapted to determine at least one result item, responsive to the scoring of each user log, so as to discover a relationship based exclusively on detected user item selections and the at least one query item (P31.14-P32.12; P34.11-P34.12; P41.5-P41.19; P42.16-P46.5; P59.1-P59.6).

5. Claim 93

Claim 93 is directed to a computer-readable medium comprising computer-readable code for discovering a relationship between a first item and a second item, (P1.11-P1.15; P19.13-P19.16; P41.5-P46.5; P58.1-P67.15; D1A.1604; D3.302-D3.305; D4-D7; D14.1401-D14.1406; D15.1501-D15.1506) comprising:

computer-readable code adapted to determine, in a computer, a total number of item groups N (P60.12);

computer-readable code adapted to determine, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item (P60.13);

computer-readable code adapted to determine, in the computer, a number of item groups N_2 not in the subset of item groups (P60.14);

computer-readable code adapted to determine, in the computer, a number of item groups k_{11} in the subset that contain the first item (P60.15);

computer-readable code adapted to determine, in the computer, a number of item groups k_{12} not in the subset that contain the first item (P60.16-P60.17);

computer-readable code adapted to determine, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item (P60.18-P60.19);

computer-readable code adapted to determine, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item (P60.20-P60.21);

computer-readable code adapted to determine, in the computer, a log likelihood ratio (P61.1-P61.4); and

computer-readable code adapted to generate, based on the log likelihood ratio, a representation of the relationship between the first item and the second item (P59.10-P59.17).

37 C.F.R. § 41.37(c)(1)(vi): GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1, 4-14, 17-27, 32, 33, 39, 42-45, 48-59, 62-72, 75-85, 91 and 92 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hosken (U.S. Pat. No. 6,438,579).

2. Claims 2, 3, 28-31, 34-38, 40, 41, 60, 61, 86-90, 93-97 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hosken in view of Lazarus (U.S. Patent No. 6,430,539).

3. Claims 15, 16, 46, 47, 73 and 74 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hosken in view of Ward (U.S. Patent No. 6,526,411).

37 C.F.R. § 41.37(c)(1)(vii): ARGUMENT

I. Introduction

A. Grouping of Claims

The claims do not stand or fall together. Arguments are presented below for the separate patentability of the following groups of claims:

1. Ground of rejection (1):

a. Group (1): Claims 1, 4-8, 12-14, 17-21, 24-26, 32, 33, 39, 42-45, 48, 49, 51-53, 56-59, 62-66, 70-72, 75-79, 82-84, 91 and 92 (Claims 1, 39 and 59 independent);

b. Group (2): Claims 9, 50 and 67;

c. Group (3): Claims 22, 23, 54, 55, 80 and 81;

d. Group (4): Claims 27 and 85; and

e. Group (5): Claims 10, 11, 68 and 69.

2. Ground of rejection (2):

a. Group (1): Claims 34, 36, 93 and 95 (Claims 34 and 93 independent);

b. Group (2): Claims 28, 86 and 87

c. Group (3): Claims 2, 3, 40, 41, 60 and 61; and

d. Group(4): Claims 29-31, 35, 37, 38, 88-90, 94, 96 and 97.

3. Ground of rejection (3):

a. Group (1): Claims 15, 16, 46, 47, 73 and 74.

B. Effective Filing Date

1. The Present Application

The present application claims the benefit of U.S. Provisional Application No. 60/201,622 (hereinafter referred to as the "'622 provisional") filed May 3, 2000. The claims of the present application are fully supported by the description provided in the 622 provisional. Reference is respectfully made to section 5.2.2 entitled "Likelihood Ratio for Binomials and Multinomials", commencing at page 65 of the '622 provisional, the section entitled "Analysis of Play Logs and Libraries" commencing at page 216 of the '622 provisional, and to pages 301 to 304, of the '622 provisional, for example.

2. Hosken

Hosken was filed on July 14, 2000, which is after the May 3, 2000 effective filing date of the present application. While Hosken claims the benefit of U.S. Provisional Application No. 60/144,377 (the '377 Hosken provisional), it is respectfully submitted that in order for Hosken to be considered prior art to the claims of the present application, there must be a showing to establish that the '377 Hosken provisional application provides full support, in compliance with 35 U.S.C. § 112, for the subject matter of Hosken relied-upon. See MPEP § 2136.03 (III).

By way of just one example, the Appellant respectfully submits that there is no § 112, first paragraph support in the Hosken provisional for how user actions are actually used to modify a user profile, and/or make a recommendation using user actions. The Hosken provisional describes that a user profile contains ratings information and that the ratings information is needed to make a recommendation. In order to modify a user profile or make a recommendation in accordance with the collaborative recommendation system described in the Hosken provisional, a user action would need to be translated into ratings information before it can be used to make a recommendation. The Hosken provisional fails to provide any description, enabling or otherwise, as to how user actions could even be translated into ratings information. The Hosken provisional lacks any disclose as to how user actions can be used with its recommendation system. The Hosken provisional, at page 6, lines 7 to 10, describes a user profile table as follows:

> The User Profile Tables (user profile, user profile rating) contains identifying information about music items linked to a user. The information in this table can be provided using explicit rating information provided by the user or through implicit observation by the system based on users' actions.
>
> At page 8, lines 18 to 21, the '377 provisional states that:
>
> The user may explicitly enter music items and ratings using a form style interface or the system may derive implicit ratings of music items based on the system's observations of the user's actions.

The Hosken provisional identifies a user profile table as consisting of explicit rating information provided by the user or information provided through implicit observation of user actions. The Hosken provisional lacks any disclosure, enabling or otherwise, as to how user profile information or user profile rating information, is derived from implicit observation of user actions. Furthermore, the Hosken provisional fails to provide any disclosure that would enable one of ordinary skill to use implicit observation of user actions or observed behavior to select a user profile and/or select an item in a user profile, which the Hosken provisional describes must be done in order to make a collaborative recommendation.

Other portions of Hosken which cannot be found in the Hosken provisional, include, for example, col. 2, line 52 to col. 3, line 34; col. 5, line 8 to col. 6. line 38; col. 9, lines 23 to 65; col. 10, line 20 to col. 11, line 12; and col. 12, line 10 to col. 13, line 25 of Hosken.

3. Ward

Ward was filed on November 15, 2000, which is after the May 3, 2000 effective filing date of the present application. While Ward claims the benefit of U.S. Provisional Application No. 60/165,726, filed on November 15, 1999 (the '726 Ward provisional"), U.S. Provisional Application No. 60/165,727, filed on November 15, 1999 (the '727 Ward provisional"), and U.S. Provisional Application No. 60/166,039, filed on November 17,1999 (the '039 Ward provisional), it is respectfully submitted that in order for Ward to be considered prior art to the claims of the present application, there must be a showing to establish that at least one of the

provisional applications provides full support, in compliance with 35 U.S.C. § 112, for the subject matter of Ward relied-upon. See MPEP § 2136.03 (III).

C. References cited in the final rejection

1. Hosken

Hosken is understood to describe a system for generating a combined content and collaborative recommendation (col. 16, lines 25-29), with the content recommendation being generated using predefined relationships established for content, i.e., predefined relationships between artists, genres and albums (col. 14, lines 64-67), and the collaborative recommendation being generated using user-cluster relationships, i.e., clusters of users(col. 15, lines 18-26).

Hosken is understood to generate a content recommendation using a user's favorites table, which contains items and a rating for each item, such as the Pet Shop Boys rated 9 out of a possible 10, New Order rated 6 and The Cranberries rated 6 (col. 14, lines 42-44 and 49-53) for these items. The entry which has the highest associated rating (i.e., Pet Shop Boys) is selected, and used to search artists, artist association, album and genre tables to identify artists, albums and genres that are related to Pet Shop Boys (col. 14, line 57 – col. 15., line 7). Each item found (i.e., genres British Pop and 1980s Dance, artist association New Order, and album Bilingual) are added to a content results table (col. 15, lines 6-7).

Hosken is understood to use the favorites table and a cluster table to generate a collaborative recommendation. More particularly, the cluster table associates users and clusters (col. 15, lines 12-40). One such cluster identified in Hosken is a "Dance" cluster, to which a number of users belong. The system identifies the cluster to which the requesting user, i.e., the user for whom the recommendation is being generated, is most closely aligned, and then examines each user that belongs to the identified cluster, i.e., the Dance cluster, determines a correlation between the cluster user and the requesting user to determine whether the two users have similar tastes, i.e., whether a calculated correlation satisfies a correlation threshold (col. 15, lines 46 – col. 16, line 5). If the two users are determined to have similar tastes, items contained in the cluster user's user profile that are not in the requesting user's profile are included in the collaborative results table (col. 15, lines 59-64). The content and the collaborative results tables are then combined to provide a recommendation (col. 16, lines 25-29).

2. Lazarus

Lazarus describes grouping merchants into merchant segments derived based on spending patterns of customers, i.e., co-occurrences of purchases at merchants in consumer transactions, creates a predictive model of future spending in each merchant segment, and uses the predictive models associated with the merchant segments to predict consumer spending in a merchant segment (abstract, col. 3, lines 11-26, col. 4, lines 11-20 of Lazarus). Lazarus analyzes co-occurrences of two merchants, *i* and *j*, in a sequence of merchant transactions made by a consumer, to identify that the two merchants both occur in the transaction sequence, i.e., that the consumer made a purchase from each of the two merchants during the time frame set by a time window (see col. 19, line 2 – col. 23, line 28). Lazarus creates a vector for a merchant, *i*, which identifies the number of co-occurrences with merchant, *j*; a merchant's vector also identifies the total number of co-occurrences for the merchant. Lazarus determines an expected number of co-occurring transactions, $\hat{T}_{ij}$, based on a total number, T_i, of co-occurring transactions for merchant, *i*, a total number, T_j, of co-occurring transactions for merchant, *j*, and a total number of co-occurring transactions, *T*; and determines that two merchants are related if the difference between the actual number of co-occurring transactions, T_{ij}, of the two merchants, *i* and *j*, and an expected number of co-occurring transactions, $\hat{T}_{ij}$, is much larger than a variance, σ_{ij} (col. 22, line 60 to col. 23, line 51). Lazarus uses a log likelihood ratio, $\ln \lambda$, to determine the strength of the relationship between the two merchants, r_{ij}, which is used to determine a desired dot product, d_{ij}, for the two merchants (col. 23, line 52 to col. 25, line 54). The desired dot product is compared with the actual dot product of the vectors of the two merchants to determine whether or not to update the two merchants' vectors (col. 25, line 55 to col. 27, line 6). Merchant clusters are then identified using the resulting merchant vectors, and a list of merchants in each cluster is generated, and merchants that frequently co-occur and have high dot products between their merchant vectors will tend to form merchant segments (col. 27, line 23 to col. A predictive model of consumer spending in each merchant segment is then generated from past transactions of consumers in the merchant segment (col. 28, lines 24 to 27).

3. Ward

Ward is understood to provide a system and method for creating a dynamic playlist using a seed, such as a meta-category (artist) from an existing playlist, to query content providers for

content pieces fitting the seed meta-category (col. 6, lines 57-61 and col. 7, lines 20-39). Ward is further understood to rank or cull the content pieces selected by the query, such as keeping the top N result items that are the most popular among all of the listeners, or a subset of the listeners closest to the current playlist creator (col. 5, lines 16-19 and col. 6, lines 61-64). Ward is further understood to order the items in a playlist based on a popular sort order (col. 5, lines 8-10). Ward is understood to track the ordering of songs in a playlist and to note song pairings, i.e., two songs in sequence in a playlist (col. 7, lines 44-47 and col. 8, line 53 - col. 9, line 7). Ward is understood to record a user's expressed dislike for a particular content item, i.e., the user expresses dislike for the item either by skipping the item or through a rating system (see col. 8, lines 20-40).

II. Arguments with respect to ground of rejection (1)

A. Group (1): Claims 1, 4-8, 12-14, 17-21, 24-26, 32, 33, 39, 42-45, 48, 49, 51-53, 56-59, 62-66, 70-72, 75-79, 82-84, 91 and 92 (Claims 1, 39 and 59 independent)

1. Limitations recited in the claims

a. Independent Claim 1 recites a method of discovering relationships between items. Item selections detected from a plurality of users are accepted, and a log is generated for each user. Each log contains identifiers corresponding to detected user item selections. A query including at least one query item identifier is accepted. Each of the user logs is scored. The scoring for each user log is responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query. The user log score generated for each user log is based exclusively on detected user item selections and the at least one query item. At least one result item is determined, responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item.

b. Independent Claim 39 recites a system for discovering relationships among items. A user interface accepts item selections from a plurality of users, and at least one log database, which is coupled to the user interface, stores a log for each user, each log contains identifiers corresponding to detected user item selections. A query input device accepts a query including

at least one query item identifier. A relationship discovery engine, coupled to the log database and to the query input device, scores each of the user logs. The scoring for each user log is responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and for determining at least one result item, responsive to the scoring of each user log, so as to discover a relationship based exclusively on detected user item selections and the at least one query item.

c. Independent Claim 59 recites a computer-readable medium comprising computer-readable code for discovering relationships between items. Item selections detected from a plurality of users are accepted, and a log is generated for each user. Each log contains identifiers corresponding to detected user item selections. A query including at least one query item identifier is accepted. Each of the user logs is scored. The scoring for each user log is responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query. The user log score generated for each user log is based exclusively on detected user item selections and the at least one query item. At least one result item is determined, responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item.

f. Claims 4-8, 12-14, 17-21, 24-26, 32 and 33 depend either directly or indirectly from Claim 1; Claims 42-45, 48, 49, 51-53 and 56-58 depend from Claim 39; and Claims 62-66, 70-72, 75-79, 82-84, 91 and 92 depend from Claim 59. All of these claims therefore include the limitations noted above.

2. Hosken does not disclose or suggest a log generated for a user of a plurality of users, the log containing identifiers corresponding to the detected user item selections accepted from the user, as required by the claims

a. Reference is respectfully made to log database D9.114 of the present application. Log database D9.114, includes a log segment D9.902 for a user D9.901, which identifies an

upload time for the log segment. The log segment D9.902 is related to a plurality of log elements, each of which includes an action, a count and a track identifier, which identifies the track. Log database D9.114 contains identifiers corresponding to user item selections accepted from the user.

b. At pages 2-3, the Office Action equates Hosken's user profile to the claimed log. Table I, at col. 7, line 57 to col. 8, line 37 of Hosken, states that a user profile includes "characterizing attribute and media content ratings for … media content items linked to a user." Table I of Hosken describes that the information in this table is derived from explicit rating information provided by the user and implicit observations performed by the system against user browsing actions. Hosken does not disclose how it derives the information contained in the user profile from implicit observations performed by the system against user browsing actions. The '377 Hosken provisional does not provide any disclosure as to how the information contained in Hosken's user profile is derived from implicit observations. Furthermore, Hosken does not disclose that its user profile is a log of item selections detected from a user, nor does it disclose that it is a log containing identifiers corresponding to the detected user item selections, as claimed.

3. Hosken fails to disclose or suggest scoring a user log responsive to a frequency of occurrence of a query item identifier in the user log and a frequency of occurrence of a query item identifier in all of the user logs, as required by the claims

a. In accordance with at least one disclosed embodiment, a log score is determined using the number of occurrences of a track in the log (see P64.10, and P62.1 – P62.5 of the application, for example). In accordance with at least one such embodiment, scoring a user log is responsive to a weighting, w_{ij}, including a factor, α , or k_{ij}, which represents the frequency, or number of occurrences, of a track, j, in a log, i. In accordance with one or more embodiments, the track is a query track identified by a query term identifier, and the frequency of occurrence of the query term identifier represents the number of times the query track occurs in a user's log, e.g., the number of times that the user selected a track. The disclosure provides that a frequency of a track identifies the number of occurrences, even multiple occurrences, of a track in the log. In accordance with at least one embodiment, the frequency of a track, *j*, in a user log, *i*, is used in a weighting, w_{ij}, to score a log, *i*.

In accordance with at least one disclosed embodiment, the scoring of a user log is responsive to the frequency of occurrence, or the number of occurrences of the query item, in the user's log.

b. In accordance with at least one disclosed embodiment, a log score is determined using the number of occurrences of a track in all of the user logs (see P64.10, and P62.12 - P62.13 of the application, for example). In accordance with at least one such embodiment, scoring a user log is responsive to a weighting, w_{ij}, including a factor, β, which represents the frequency, or number of occurrences, of a track, j, in all of the user logs. In accordance with one or more embodiments, the track is a query track identified by a query term identifier, and the frequency of occurrence of a query track in all user logs represents the number of times the query track occurs in all of the users' logs, e.g., the number of times that the users selected the track. The disclosure provides that a frequency of a track identifies the number of occurrences, even multiple occurrences, of a track in the user logs. In accordance with at least one embodiment, the frequency of a track, *j*, in all of the user logs is used in a weighting, w_{ij}, to score a log, *i*.

c. Hosken's correlating one user profile to another user profile and generating weighted rating for an item fails to disclose or suggest scoring a user log responsive to a frequency of occurrence of a query item identifier in the user log and a frequency of occurrence of a query item identifier in all of the user logs.

The Office Action appears to read Hosken's correlating one user profile to another user profile and generating weighted rating for an item as disclosing or suggesting scoring a user log responsive to a frequency of occurrence of a query item identifier in the user log and a frequency of occurrence of a query item identifier in all of the user logs.

As discussed above, Hosken's user profile is not a log of item selections detected from a user. Hosken's user profile contains item ratings. The '377 Hosken provisional fails to provide any description of how Hosken correlates user profiles. According to Hosken, user profiles are correlated by correlating user ratings contained in the user profiles (see abstract and col. 7, lines 7-9). Hosken describes that, in a case that a user profile correlates with the user profile of the user for whom the items are being identified, a rating of an item contained in the correlated user profile is modified to generate a weighted rating from the item's rating and the correlation value determined between the two user profiles.

Hosken does not disclose or suggest a frequency of occurrence of a query item identifier in a user log. Hosken does not disclose or suggest scoring a user log responsive to a frequency of occurrence of a query item identifier in the user log. Hosken does not disclose or suggest a frequency of occurrence of a query item identifier in a user log. Hosken does not disclose or suggest scoring a user log responsive to a frequency of occurrence of a query item identifier in all of the user logs.

4. Hosken fails to disclose or suggest scoring a user log responsive to a query weight, as required by the claims

a. In accordance with at least one disclosed embodiment, a log score is determined using a query weighting (see P64.5 – P64.10 of the application, for example). In accordance with at least one such embodiment, scoring a user log is responsive to a query weighting, q_j, which represents the frequency, or number of occurrences, of a track, j, in the query. In accordance with one or more embodiments, the track is a query track identified by a query term identifier, and the frequency of occurrence of a query track in the query represents the number of times the query track occurs in the query. The disclosure provides that a frequency of a track identifies the number of occurrences, even multiple occurrences, of a track in the query. In accordance with at least one embodiment, the frequency of a track, j, in the query is used in a weighting, q_j, to score a log, i.

Thus, in accordance with at least one disclosed embodiment, the scoring of a user log is responsive to the frequency of occurrence, or the number of occurrences of the query item, in the query.

b. Hosken's correlating one user profile to another user profile and generating weighted rating for an item fail to disclose or suggest scoring a user log responsive to a query weighting.

The Office Action appears to equate the claimed user log scoring responsive to a query weighting with Hosken's correlating one user profile to another user profile and generating a weighted rating for an item.

As discussed above, Hosken's user profile is not a log of item selections detected from a user. Hosken's user profile contains item ratings. The '377 Hosken provisional fails to provide any description of how Hosken correlates user profiles. According to Hosken, user profiles are

correlated by correlating user ratings contained in the user profiles (see abstract and col. 7, lines 7-9). Hosken describes that, in a case that a user profile correlates with the user profile of the user for whom the items are being identified, a rating of an item contained in the correlated user profile is modified to generate a weighted rating from the item's rating and the correlation value determined between the two user profiles.

Hosken does not disclose or suggest a frequency of occurrence of a query item identifier in a query. Hosken does not disclose or suggest scoring a user log responsive to a frequency of occurrence of a query item identifier in a query.

5. Hosken fails to disclose or suggest generating a user log score for each user log based exclusively on detected user item selections and the at least one query item, as required by the claims

a. The Office Action, commencing at the last paragraph of page 3, concedes that Hosken uses both "explicit and implicit profiling data" (at the top of page 4 of the Office Action), but then considers that it would have been obvious to "implement selected features" of Hosken by "[o]mitting Hosken's collection of explicit user profile."

b. Hosken describes that a user profile is derived from explicit rating information provided by the user and implicit observations performed by the system against user browsing actions. Hosken does not disclose how it derives the information contained in the user profile from implicit observations performed by the system against user browsing actions. The '377 Hosken provisional does not provide any disclosure as to how the information contained in Hosken's user profile is derived from implicit observations. Hosken uses ratings information to correlate user profiles and to generate a weighted rating for an item. Nothing in the '377 Hosken provisional describes how a user rating could be generated from implicit profiling data. Hosken describes that explicit ratings are input by the user. Hosken fails to provide a description of how a rating could be generated from implicit profiling data, and any such description would not find support in the '377 Hosken provisional. Since Hosken relies on user ratings to perform its correlation and weighted user rating determinations, omission of the explicit user profiling data would result in an inability for Hosken to perform the same functions. Elimination of the explicit profiling data from Hosken is not an "obvious expedient," as suggested in the Office Action (at page 4). Hosken is devoid of any teaching of eliminating explicit profiling data, and

is devoid of any teaching as to how to correlate user profiles and/or generate a weighted rating without the explicit ratings profiling data. Elimination of explicit profiling data from Hosken is not an "obvious expedient, since Hosken cannot perform the same functions performed using the explicit profiling data if the explicit profiling data is eliminated.

6. Hosken fails to disclose or suggest scoring, in the computer, each of the user logs, as required by the claims

a. In view of the above discussion, it is submitted that Hosken fails to disclose or to suggest scoring, in the computer, each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item.

7. Hosken fails to disclose or suggest determining, in the computer, at least one result item, responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims

a. In view of the above discussion, it is submitted that Hosken fails to disclose determining at least one result item responsive to the scoring of each log, and further fails to disclose or suggest discovering at least one relationship based exclusively on detected user item selections and at least one query item by determining at least one result item responsive to the user log scoring.

8. Hosken fails to disclose or suggest multiple elements of the claims, and therefore cannot form the basis of an obviousness rejection under § 103(a)

a. Hosken fails to disclose or suggest at least the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, and determining at least one result item responsive to the scoring of each user log, as required by the claims. Hosken therefore cannot form the basis of an obviousness rejection of the claims under § 103(a)

B. Group (2): Claims 9, 50 and 67

1. Limitations recited in the claims

a. Claim 9 depends from Claim 1, Claim 50 depends from Claim 39, and Claim 67 depends from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 9, 50 and 67 further recite that each item comprises a music track, and that a format schedule specifying music track categories for time periods is accepted, and a track list conforming to the format schedule is generated, which contains an identifier for each determined result item comprising a music track.

c. At P16.4 – P16.19, P22.21 – P23.5, P32.17 – P32.21, P34.14 – P38.10, the present application describes that a format schedule, e.g., play a top-40 hit at the top of each hour, can be used in generating a listing of the at least one result item, i.e., track.

2. Hosken fails to disclose or suggest accepting a format schedule specifying music track categories for time periods, and generating a track list conforming to the format schedule, the generated track list containing an identifier for each determined music track result item, as required by the claims

a. At page 4, the Office Action cites col. 12, line 38 – col. 13, line 30 of Hosken as disclosing the limitations of Claims 9 and 67, and then cites, at page 5, col. 8, lines 38-65 of Hosken as disclosing the limitations of Claim 50.

b. Hosken, at col. 12, line 38 – col. 13, line 30, describes a referral system that operates as a graph traversal system. According to the cited portion of Hosken, relationships between characterizing attributes are weighted and a confidence level is associated with an

attribute relationship; and, the graph of related attributes is traversed in steps determined using the confidence levels associated with the relationships, and an accumulated weighted value is determined by adding the weights from the relationships traversed in each step in the traversal.

Hosken, at col. 8, lines 38-65, describes a results table that stores a list of media content recommendations, the list can be sorted using weights of the characterizing attributes as the key, and output of media content item list is presented to the user at a personal computer monitor, kiosk display, touch pad screen, mobile phone display or other informational screen.

c. The Office Action fails to identify any portion of Hosken, and none can be found, that discloses accepting a format schedule specifying music track categories for time periods, and generating a track list conforming to the format schedule, the generated track list containing an identifier for each determined music track result item. The cited portions of Hosken fail to disclose or suggest accepting a format schedule specifying music track categories for time periods, and generating a track list conforming to the format schedule, the generated track list containing an identifier for each determined music track result item, as required in Claims 9, 50 and 67.

C. Group (3): Claims 22, 23, 54, 55, 80 and 81

1. Limitations recited in the claims

a. Claims 22 and 23 depend from Claim 1, Claims 54 and 55 depend from Claim 39, and Claims 80 and 81 depend from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 22, 54 and 80 further recite outputting an advertisement relating to the determined at least one result item. Claims 23 (which depends from Claim 22), Claim 55 (which

depends from Claim 54), and Claim 81 (which depends from Claim 80) further recite that outputting an advertisement relating to the determined at least one result item displays at least one selected form the group consisting of: a web page, a banner, a portion of a web page, and an animation.

c. At P29.8 – P29.13, P71.8 – P71.16, the present application describes that discovered relationships among tracks, albums or artists can be used to select advertisements associated with particular tracks, albums or artists for presentation to the user.

2. Hosken fails to disclose or suggest outputting an advertisement relating to the determined at least one result item, and/or outputting an advertisement relating to the determined at least one result item displays at least one selected form the group consisting of: a web page, a banner, a portion of a web page, and an animation, as required by the claims

a. At page 5, the Office Action cites col. 8, lines 38-53 and col. 16, lines 24-54 of Hosken as disclosing the limitations of Claims 22, 23, 54 55, 80 and 81.

b. The Office Action fails to identify any portion of Hosken, and none can be found, that disclose or suggest outputting an advertisement relating to the determined at least one result item (Claims 22, 54 and 80), and/or outputting an advertisement relating to the determined at least one result item displays at least one selected form the group consisting of: a web page, a banner, a portion of a web page, and an animation (Claims 23, 55 and 81). Nothing in the cited portions of Hosken disclose or suggest outputting an advertisement relating to the determined at least one result item (Claims 22, 54 and 80), and/or outputting an advertisement relating to the determined at least one result item displays at least one selected form the group consisting of: a web page, a banner, a portion of a web page, and an animation (Claims 23, 55 and 81), as required by the claims.

D. Group (4): Claims 27 and 85

1. Limitations recited in the claims

a. Claim 27 depends from Claim 1 and Claim 85 depends from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user

logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 27 (which depends from Claim 26, which depends from Claim 24) and 85 (which depends from Claim 84, which depends from Claim 82) further recite outputting a notification relating to the determined at least one result item by sending a communication to a user, the communication comprising at least one selected from the group consisting of: transmitting an electronic mail message to the user, telephoning the user, sending a direct mail item to the user.

2. Hosken fails to disclose or suggest outputting a notification relating to the determined at least one result item by sending a communication to a user, the communication comprising at least one selected from the group consisting of: transmitting an electronic mail message to the user, telephoning the user, sending a direct mail item to the user, as required by the claims

a. At page 5, the Office Action cites col. 8, lines 38-53 and col. 16, lines 24-54 of Hosken as disclosing the limitations of Claims 27 and 85.

b. The Office Action fails to identify any portion of Hosken, and none can be found, that disclose or suggest outputting a notification relating to the determined at least one result item by sending a communication to a user, the communication comprising at least one selected from the group consisting of: transmitting an electronic mail message to the user, telephoning the user, sending a direct mail item to the user, as required by Claims 27 and 85. Nothing in the cited portions of Hosken disclose or suggest outputting a notification relating to the determined at least one result item by sending a communication to a user, the communication comprising at least one selected from the group consisting of: transmitting an electronic mail message to the user, telephoning the user, sending a direct mail item to the user, as required by Claims 27 and 85.

E. Group (5): Claims 10, 11, 68 and 69

1. Limitations recited in the claims

a. Claims 10 and 11 depend from Claim 1, and Claims 68 and 69 depend from Claim 59, and therefore include the limitations of generating a log for each user, which contains an identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 10 (which depends from Claim 5) and 68 (which depends from Claim 63) further recite that each item is a music track and scoring the user logs comprises determining a frequency of occurrence in each user log of at least one music track identified by the query item identifier, and Claims 11 (which depends from Claim 5) and 69 (which depends from Claim 63) further recite that each item is a music track and scoring the user logs further comprising determining a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier.

2. Hosken fails to disclose or suggest scoring user logs responsive to a frequency of occurrence of a query item, scoring a user log by determining a frequency of occurrence in each user log of at least one music track identified by the query item identifier, or scoring the user logs by determining a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier, as required by the claims

a. At page 4, the Office Action cites col. 12, line 38 – col. 13, line 30 of Hosken as disclosing the limitations of Claims 10, 11, 68 and 69.

b. Hosken, at col. 12, line 38 – col. 13, line 30, describes a referral system that operates as a graph traversal system. According to the cited portion of Hosken, relationships between characterizing attributes are weighted and a confidence level is associated with an

attribute relationship; and, the graph of related attributes is traversed in steps determined using the confidence levels associated with the relationships, and an accumulated weighted value is determined by adding the weights from the relationships traversed in each step in the traversal.

c. As discussed above, the Office Action fails to identify any portion of Hosken, and none can be found, that discloses or suggests scoring the user logs, and/or scoring user logs responsive to a frequency of occurrence of a query item. It follows then that Hosken fails to disclose or suggest scoring a user log by determining a frequency of occurrence in each user log of at least one music track identified by the query item identifier, as required by Claims 10 and 68, or scoring the user logs by determining a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier, as required by Claims 11 and 69.

d. The cited portions of Hosken fail to disclose or suggest scoring user logs responsive to a frequency of occurrence of a query item, and further fails to disclose or suggest scoring a user log by determining a frequency of occurrence in each user log of at least one music track identified by the query item identifier, as required by Claims 10 and 68, or scoring the user logs by determining a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier, as required by Claims 11 and 69.

III. Arguments with respect to ground of rejection (2)

A. Group (1): Claims 34, 36, 93 and 95 (Claims 34 and 93 independent)

1. Limitations recited in the claims

a. Independent Claim 34 is directed to a method of discovering a relationship between a first item and a second item. The method determines a total number of item groups N, determines a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item; determines a number of item groups N_2 not in the subset of item groups; determines a number of item groups k_{11} in the subset that contain the first item; determines a number of item groups k_{12} not in the subset that contain the first item; determines a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item; determines a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do

not contain the first item; determines a log likelihood ratio; and generates, based on the log likelihood ratio, a representation of the relationship between the first item and the second.

b. Independent Claim 93 is directed to a computer-readable medium comprising computer-readable code for discovering a relationship between a first item and a second item. The code determines a total number of item groups N, determines a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item; determines a number of item groups N_2 not in the subset of item groups; determines a number of item groups k_{11} in the subset that contain the first item; determines a number of item groups k_{12} not in the subset that contain the first item; determines a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item; determines a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item; determines a log likelihood ratio; and generates, based on the log likelihood ratio, a representation of the relationship between the first item and the second.

c. Claim 36 depends directly from Claim 34, and Claim 95 depends directly from Claim 93. Claims 36 and 95 therefore include the limitations noted above.

2. None of the cited references disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims

a. The Office Action, at page 6, cites Hosken, i.e., elements 70, 68 and 64 of Figure 2 and col. 15, line 10 – col. 16, line 21 against the claims.

b. The cited portion of Hosken is understood to describe a collaborative recommendation system, which correlates user profiles, and adds items from a correlated user profile to a result table. The collaborative recommendation system generates a correlation value that correlates two user profiles, and modifies an item rating using the correlation value. The cited portion of Hosken does not disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number,

k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

c. Lazarus fails to disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

d. Accordingly, a combination of Hosken and Lazarus does not render the claims obvious, since Lazarus does not and cannot supply the elements missing from Hosken of determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

B. Group (2): Claims 28, 86 and 87

1. Limitations recited in the claims

a. Claim 28 depends from Claim 1, and Claims 86 and 87 depend from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claim 28 further recites that the determined result is responsive to a significance of occurrence of the item in at least a subset of the scored user logs, and the significance of

occurrence of the item is determined by a log likelihood ratio analysis submethod, which includes determining, in the computer, a total number of user logs N; determining, in the computer, a number of user logs N_1 in a subset of user logs; determining, in the computer, a number of user logs N_2 not in the subset of user logs; determining, in the computer, a number of user logs k_{11} in the subset that include the item; determining, in the computer, a number of user logs k_{12} not in the subset that include the item; determining, in the computer, a number of user logs $k_{21} = N_1 - k_{11}$ in the subset that do not include the item; determining, in the computer, a number of user logs $k_{22} = N_2 - k_{12}$ not in the subset that do not include the item; and determining, in the computer, a log likelihood ratio for the item.

c. Claim 86 further recites that the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs, and code to determine a determined at least one result item comprises code to determine the result by a log likelihood ratio analysis submethod. Claim 87 (which depends from Claim 86) further recites that the code to determine the result by a log likelihood ratio analysis submethod comprises determining, in the computer, a total number of user logs N; determining, in the computer, a number of user logs N_1 in a subset of user logs; determining, in the computer, a number of user logs N_2 not in the subset of user logs; determining, in the computer, a number of user logs k_{11} in the subset that include the item; determining, in the computer, a number of user logs k_{12} not in the subset that include the item; determining, in the computer, a number of user logs $k_{21} = N_1 - k_{11}$ in the subset that do not include the item; determining, in the computer, a number of user logs $k_{22} = N_2 - k_{12}$ not in the subset that do not include the item; and determining, in the computer, a log likelihood ratio for the item.

d. At P64.19 –P65.12 and P60.8 – P61.9 of the present application, an occurrence of an item, e.g., a track, album or artist, is measured using a log likelihood ratio measurement. The log likelihood ratio is determined based on the number of occurrences, π_{ij}, of the item, j, in a user log, i, and the number of occurrences, μ_j, of the item, j, in all of the user logs (see P61.2 and P62.4 – P62.5).

2. None of the cited references disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number,

k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims

a. As discussed above, Hosken's collaborative recommendation system generates a correlation value that correlates two user profiles, and modifies an item rating using the correlation value. Hosken does not disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

b. As is discussed above, Lazarus also fails to disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

c. Accordingly, a combination of Hosken and Lazarus does not, and cannot, disclose or suggest determining a total number, N, of item groups, a number, N_1, of item groups in a subset that contain a second item, a number, N_2, of item groups not in the subset, a number, k_{11}, of item groups that contain a first item, a number, k_{12}, of item groups not in the subset that contain the first item, a number, k_{21}, of item groups in the subset that do not contain the first item, a number k_{22}, of item groups not in the subset that do not contain the first item, as required by the claims.

3. None of the cited references disclose or suggest a significance of occurrence of the item in at least a subset of the scored user logs, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis, as required by the claims

a. The Office Action, at page 6, concedes that Hosken fails to disclose or suggest a significance of occurrence of an item determined by a log likelihood ratio analysis.

b. Lazarus cannot remedy the deficiencies of Hosken, since Lazarus also fails to disclose or suggest a significance of occurrence of the item in at least a subset of the scored user logs, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis.

Lazarus predicts future sales by consumers in a merchant segment using a predictive model. Lazarus analyzes co-occurrences of two merchants, *i* and *j*, in a window of merchant transactions made by a consumer, to identify that the two merchants both occur in the transaction window, i.e., that the consumer made a purchase from each of the two merchants during the time frame set by the window. Lazarus creates a vector for a merchant, *i*, which identifies the number of co-occurrences with merchant, *j*; a merchant's vector also identifies the total number of co-occurrences for the merchant. Lazarus determines the significance of the co-occurrences of two merchants, *i* and *j*, by determining whether the actual number of co-occurring transactions, T_{ij}, of the two merchants, *i* and *j*, and an expected number of co-occurring transactions, $\hat{T}_{ij}$, is much larger than a variance, σ_{ij}. Lazarus uses a log likelihood ratio, $\ln \lambda$, to determine the strength of the relationship between the two merchants, r_{ij}, which is used to determine a desired dot product, d_{ij}, for the two merchants (col. 23, line 52 to col. 25, line 54).

In contrast to determining a significance of co-occurrences of two merchants in consumer spending at the merchants, the claimed significance is a significance of an occurrence, and is a significance of an occurrence of an item in at least a subset of scored user logs. In contrast to using expected and actual co-occurrences of two merchants in consumer spending transactions, the claimed significance of occurrence of an item in a subset of user logs is determined using a log likelihood ratio. In contrast to using a log likelihood ratio to determine the strength of the relationship between two co-occurring merchants, the claimed log likelihood ratio is used to determine the significance of occurrence of an item in a subset of user logs.

c. Accordingly, a combination of Hosken and Lazarus does not render the claims obvious, since Lazarus does not and cannot supply the elements missing from Hosken of a significance of occurrence of the item in at least a subset of the scored user logs, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis, as required by the claims.

C. Group (3): Claims 2, 3, 40, 41, 60 and 61

1. Limitations recited in the claims

a. Claims 2 and 4 depend from Claim 1, Claims 40 and 41 depend from Claim 39, and Claims 60 and 61 depend from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 2, 40 and 60 further recite that determining at least one result item responsive to the scoring of each user log is further responsive to a determined significance of occurrence, the significance of occurrence being determined by a log likelihood ratio analysis. Claims 3, 41 and 61 further recite that determining at least one result item responsive to the scoring of each user log is further responsive to a determined significance of occurrence, the significance of occurrence being determined by a substantial equivalent of a log likelihood ratio analysis.

c. At P48.17 – P49.7 and D9, the present application describes that log database D9.114 includes one or more log segments D9.902 for a user D9.901, which identifies an upload time and estimated period for the log segment, that each log segment D9.902 is related to a plurality of log elements, and each of the log elements includes an action, a count and a track identifier, which identifies the track. Log database D9.114 contains identifiers corresponding to user item selections accepted from the user. At P27.16 – P28.3, the present application describes that log database D9.114 stores information describing user behavior, such as a user's interaction with jukebox D1A.103, including track selection, repeats, aborts and skips, and the like, and that the data is periodically updated as new information becomes available.

2. None of the cited references disclose or suggest a significance of occurrence, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis, as required by the claims

a. The Office Action, at page 6, concedes that Hosken fails to disclose or suggest a significance of occurrence by a log likelihood ratio analysis.

b. Lazarus cannot remedy the deficiencies of Hosken, since Lazarus also fails to disclose or suggest a significance of an occurrence, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis.

As discussed above, Lazarus does not disclose or suggest a significance of an occurrence f an item. Lazarus determines the significance of the co-occurrences of two merchants, i and j. Furthermore, Lazarus determine the significance of a co-occurrence using the actual number of co-occurring transactions, T_{ij}, of the two merchants, i and j, and an expected number of co-occurring transactions, $\hat{T}_{ij}$, is much larger than a variance, σ_{ij}. Lazarus uses a log likelihood ratio, $\ln \lambda$, to determine the strength of the relationship between the two merchants, r_{ij}, which is used to determine a desired dot product, d_{ij}, for the two merchants (col. 23, line 52 to col. 25, line 54).

In contrast to determining a significance of a co-occurrence, the claimed significance is a significance of an occurrence. In contrast to using expected and actual co-occurrences of two merchants in consumer spending transactions, the claimed significance of occurrence is determined using a log likelihood ratio. In contrast to using a log likelihood ratio to determine the strength of the relationship between two co-occurring merchants, the claimed log likelihood ratio is used to determine a significance of occurrence.

c. Accordingly, a combination of Hosken and Lazarus does not render the claims obvious, since Lazarus does not and cannot supply the elements missing from Hosken of a significance of an occurrence, or that the significance of occurrence of the item is determined by a log likelihood ratio analysis, as required by the claims. Furthermore, in view of the discussion of Hosken herein, Hosken fails to disclose or suggest determining at least one result item responsive to the user log scoring, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item. In view of the discussions of Lazarus and Hosken herein, the combination of Hosken and Lazarus therefore also fail to

disclose or suggest determining at least one result item responsive to the scoring of each user log is further responsive to a determined significance of occurrence, the significance of occurrence being determined by a log likelihood ratio analysis, and fail to disclose or suggest determining at least one result item responsive to the scoring of each user log is further responsive to a determined significance of occurrence, the significance of occurrence being determined by a substantial equivalent of a log likelihood ratio analysis.

D. Group (4): Claims 29-31, 35, 37, 38, 88-90, 94, 96 and 97

1. Limitations recited in the claims

a. Claims 29-31 depend from Claim 28 (which depends from Claim 1), and Claims 88-90 depend from Claim 87 (which depends from Claims 86 and 59), and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, and further includes the limitations that the determined result is responsive to a significance of occurrence of the item in at least a subset of the scored user logs, and the significance of occurrence of the item is determined by a log likelihood ratio analysis submethod, which includes determining, in the computer, a total number of user logs N; determining, in the computer, a number of user logs N_1 in a subset of user logs; determining, in the computer, a number of user logs N_2 not in the subset of user logs; determining, in the computer, a number of user logs k_{11} in the subset that include the item; determining, in the computer, a number of user logs k_{12} not in the subset that include the item; determining, in the computer, a number of user logs $k_{21} = N_1 - k_{11}$ in the subset that do not include the item; determining, in the computer, a number of user logs $k_{22} = N_2 - k_{12}$ not in the subset that do not include the item; and determining, in the computer, a log likelihood ratio for the item.

b. Claims 35, 37 and 38 depend from Claim 34, and Claims 94, 96 and 97 depend from Claim 93, and therefore include the limitations of determining a total number of item groups N, determining a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item; determining a number of item groups N_2 not in the subset of item groups; determining a number of item groups k_{11} in the subset that contain the first item; determining a number of item groups k_{12} not in the subset that contain the first item; determining a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item; determining a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item; determining a log likelihood ratio; and generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second.

c. Claims 29, 35, 88 and 94 further recite that the log likelihood ratio is defined as $\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$, where $\pi_{ij} = \frac{k_{ij}}{N_j}$, and $\mu_j = \sum_i \frac{k_{ij}}{N}$. Claims 30, 37, 87 and 96 further recite adjusting k_{ij} responsive to at least one selected from the group consisting of: the number of occurrences of the item in a user log; the logarithm of the number of occurrences of the item in a user log; the number of occurrences of the item in all user logs; the logarithm of the total number of users divided by the number of users who have selected the item; and a normalizing factor. Claims 31, 38, 90 and 97 further recite that the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

d. At P64.19 – P65.12 and P60.8 – P61.9 of the present application, an occurrence of an item, e.g., a track, album or artist, is measured using a log likelihood ratio measurement. The log likelihood ratio is determined based on a ratio, π_{ij}, of the number of occurrences, k_{ij}, of an item, j, in a user log, i, to the number of user log, N_j, that contain the item, and the ratio, μ_j, of the number of occurrences, k_{ij}, of the item, j, in all of the user logs, N (see P61.2 and P62.4 – P62.5 of the present application). At P61.14 – P63.8 of the present application, weights representing the frequency of an item within a user's log, α, the frequency of an item within all of the users' logs, β, and a normalization factor, λ, are described.

2. The applied art fails to disclose or suggest a log likelihood ratio, adjusting at least one of the k_{ij}, and a normalizing factor, as required by the claims

a. The Office Action, at page 6, cites Hosken, i.e., elements 70, 68 and 64 of Figure 2 and col. 15, line 10 – col. 16, line 21 against the claims. The Office Action, at page 6, concedes that Hosken fails to disclose or suggest a significance of occurrence by a log likelihood ratio analysis.

b. The cited portion of Hosken describes a collaborative recommendation system, which correlates user profiles, and adds items from a correlated user profile to a result table. The collaborative recommendation system generates a correlation value that correlates two user profiles, and modifies an item's rating using the correlation value. Hosken fails to disclose or suggest a log likelihood ratio defined as $\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$, where $\pi_{ij} = \frac{k_{ij}}{N_j}$, and $\mu_j = \sum_i \frac{k_{ij}}{N}$;

adjusting at least one of the k_{ij} responsive to at least one selected from the group consisting of: the number of occurrences of the item in a user log, the logarithm of the number of occurrences of the item in a user log, the number of occurrences of the item in all user logs, the logarithm of the total number of users divided by the number of users who have selected the item, and a normalizing factor; or a normalization factor, which is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight

based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

c. As discussed above, Lazarus examines co-occurrences of merchants in a consumer's transactions, Lazarus determines the significance of a co-occurrence using the actual number of co-occurring transactions, T_{ij}, of the two merchants, i and j, and an expected number of co-occurring transactions, $\hat{T}_{ij}$, is much larger than a variance, σ_{ij}, and uses a log likelihood ratio, $\ln \lambda$, to determine the strength of the relationship between the two merchants, r_{ij}, which is used to determine a desired dot product, d_{ij}, for the two merchants. Lazarus fails to disclose or suggest a log likelihood ratio defined as $\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$, where $\pi_{ij} = \frac{k_{ij}}{N_j}$, and $\mu_j = \sum_i \frac{k_{ij}}{N}$;

adjusting at least one of the k_{ij} responsive to at least one selected from the group consisting of: the number of occurrences of the item in a user log, the logarithm of the number of occurrences

of the item in a user log, the number of occurrences of the item in all user logs, the logarithm of the total number of users divided by the number of users who have selected the item, and a normalizing factor; or a normalization factor, which is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

d. Accordingly, a combination of Hosken and Lazarus does not render the claims obvious, since Lazarus does not and cannot supply the elements missing from Hosken of a log likelihood ratio defined as $\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$, where $\pi_{ij} = \frac{k_{ij}}{N_j}$, and $\mu_j = \sum_i \frac{k_{ij}}{N}$; adjusting at least one of the k_{ij} responsive to at least one selected from the group consisting of: the number of occurrences of the item in a user log, the logarithm of the number of occurrences of the item in a user log, the number of occurrences of the item in all user logs, the logarithm of the total number of users divided by the number of users who have selected the item, and a normalizing factor; or a normalization factor, which is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log. In view of the discussions of Lazarus and Hosken herein, the combination of Hosken and Lazarus therefore fail to disclose or suggest a log likelihood ratio defined as $\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$, where $\pi_{ij} = \frac{k_{ij}}{N_j}$, and $\mu_j = \sum_i \frac{k_{ij}}{N}$; adjusting at least one of the k_{ij} responsive to at least one selected from the group consisting of: the number of occurrences of the item in a user log, the logarithm of the number of occurrences of the item in a user log, the number of occurrences of the item in all user logs, the logarithm of the total number of users divided by the number of users who have selected the item, and a normalizing factor; or a normalization factor, which is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

IV. Arguments with respect to ground of rejection (3)

A. Claims 15, 16, 46, 47, 73 and 74

1. Limitations recited in the claims

a. Claim 15 and 16 depend from Claim 1, Claims 46 and 47 depend from Claim 39, and Claims 73 and 74 depend from Claim 59, and therefore include the limitations of generating a log for each user, which contains identifier corresponding to detected user item selections, scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and determining at least one result item responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item, as required by the claims and discussed above.

b. Claims 15, 46 and 73 further recite monitoring user behavior with respect to the selected items, and adjusting, in the computer, the user log responsive to the monitored user behavior. Claims 16, 47 and 74 further recite that monitoring user behavior comprises at least one selected from the group consisting of: detecting user input requesting that a selected item be repeated; detecting user input requesting that a selected item be skipped; detecting user input specifying a volume change; and detecting user input specifying that a selected item be muted.

c. At P48.17 – P49.7 and D9, the present application describes that log database D9.114 includes one or more log segments D9.902 for a user D9.901, which identifies an upload time and estimated period for the log segment, that each log segment D9.902 is related to a plurality of log elements, and each of the log elements includes an action, a count and a track identifier, which identifies the track. Log database D9.114 contains identifiers corresponding to user item selections accepted from the user. At P27.16 – P28.3, the present application describes that log database D9.114 stores information describing user behavior, such as a user's interaction with jukebox D1A.103, including track selection, repeats, aborts and skips, and the like, and that the data is periodically updated as new information becomes available.

2. The applied art fails to disclose or suggest a user log, monitoring user behavior with respect to the selected items, and adjusting, in the computer, the user log responsive to the monitored user behavior, or monitoring user behavior comprising at least one selected from the group consisting of: detecting user input requesting that a selected item be repeated; detecting user input requesting that a selected item be skipped; detecting user input specifying a volume change; and detecting user input specifying that a selected item be muted, and adjusting the user log responsive to the monitored user behavior, as required by the claims

a. The Office Action, at page 7, concedes that Hosken fails to disclose or suggest monitoring user behavior by detected user input. The Office Action cites col. 8, lines 20-40 of Ward, as teaching selecting tracks based on a user profile that includes a user's dislikes for a particular item determined by the user skipping the item or the user rating the item.

b. In addition to the concessions made in the Office Action, Hosken also fails to disclose or suggest the claimed log, as discussed herein. Hosken therefore fails to disclose or suggest a user log, monitoring user behavior with respect to the selected items, and adjusting, in the computer, the user log responsive to the monitored user behavior, or monitoring user behavior comprising at least one selected from the group consisting of: detecting user input requesting that a selected item be repeated; detecting user input requesting that a selected item be skipped; detecting user input specifying a volume change; and detecting user input specifying that a selected item be muted, and adjusting the user log responsive to the monitored user behavior.

c. Ward cannot remedy the deficiencies noted with respect to Hosken. The cited portion of Ward merely indicates that Ward records the fact that a user can express a dislike for a content item by skipping the item or rating the item, and that Ward keeps track of the items for which the user has expressed a dislike. Like Hosken, Ward also fails to disclose or suggest a user log, monitoring user behavior with respect to the selected items, and adjusting, in the computer, the user log responsive to the monitored user behavior, or monitoring user behavior comprising at least one selected from the group consisting of: detecting user input requesting that a selected item be repeated; detecting user input requesting that a selected item be skipped; detecting user input specifying a volume change; and detecting user input specifying that a selected item be muted, and adjusting the user log responsive to the monitored user behavior.

d. Accordingly, a combination of Hosken and Lazarus does not render the claims obvious, since Lazarus does not and cannot supply the elements missing from Hosken of a user log, monitoring user behavior with respect to the selected items, and adjusting, in the computer, the user log responsive to the monitored user behavior, or monitoring user behavior comprising at least one selected from the group consisting of: detecting user input requesting that a selected item be repeated; detecting user input requesting that a selected item be skipped; detecting user input specifying a volume change; and detecting user input specifying that a selected item be muted, and adjusting the user log responsive to the monitored user behavior.

V. Conclusion

It is respectfully submitted that a prima facie case of obviousness has not been established for any of the rejected claims. All of Claims 1-97 are therefore believed to be in condition for allowance.

37 C.F.R. § 41.37(c)(1)(viii): CLAIMS APPENDIX

An appendix containing a copy of the claims involved in this appeal is attached hereto.

37 C.F.R. § 41.37(c)(1)(ix): EVIDENCE APPENDIX

None (no evidence has been submitted in this application pursuant to 37 C.F.R. §§ 1.139, 1.131 or 1.132).

37 C.F.R. § 41.37(c)(1)(x): RELATED PROCEEDINGS APPENDIX

No decisions have been rendered by a court or the Board of Patent Appeals and Interferences in any proceeding identified herein pursuant to 37 CFR § 41.37(c)(1)(ii).

The applicant's undersigned attorney may be reached by telephone at 212-801-6729. All correspondence should continue to be directed to the address listed below, which is the address associated with Customer Number 76058.

Respectfully submitted,

Date: August 19, 2009

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CLAIMS APPENDIX

1. A computer-implemented method of discovering relationships between items, comprising:

accepting, in a computer, item selections detected from a plurality of users;

generating, in the computer, a log for each user, each log containing identifiers corresponding to detected user item selections;

accepting, in the computer, a query including at least one query item identifier;

scoring, in the computer, each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item;

determining, in the computer, at least one result item, responsive to the scoring of each user log, so as to discover at least one relationship based exclusively on detected user item selections and the at least one query item.

2. The computer-implemented method of claim 1, wherein a significance of occurrence is determined by a log likelihood ratio analysis and the determined result is further responsive to the determined significance.

3. The computer-implemented method of claim 1, wherein a significance of occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and the determined result is further responsive to the determined significance.

4. The computer-implemented method of claim 1, wherein each item is a video track and wherein accepting item selections comprises determining which tracks are selected for playback.

5. The computer-implemented method of claim 1, wherein each item is a music track and wherein accepting item selections comprises determining which tracks are selected for playback.

6. The computer-implemented method of claim 5, further comprising:
generating, in the computer, a track list containing an identifier for each determined result item comprising a music track.

7. The computer-implemented method of claim 6, further comprising:
deleting, in the computer, from the track list at least one identifier corresponding to a music track already selected by the user.

8. The computer-implemented method of claim 6, further comprising:
playing the music tracks specified by the generated track list.

9. The computer-implemented method of claim 5, further comprising:
accepting, in the computer, a format schedule specifying music track categories for time periods; and
generating, in the computer, a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

10. The computer-implemented method of claim 5, wherein scoring the user logs comprises determining a frequency of occurrence in each user log of at least one music track identified by the query item identifier.

11. The computer-implemented method of claim 5, wherein scoring the user logs comprises determining a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier.

12. The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input provided by a user via a web page.

13. The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input specifying an item purchase by a user.

14. The computer-implemented method of claim 1, further comprising, prior to determining the at least one result item, defining, in the computer, a subset of the scored user logs responsive to the user log scores, the at least one result item being determined from the subset of scored user logs.

15. The computer-implemented method of claim 1, further comprising:
monitoring, in the computer, user behavior with respect to the selected items; and
adjusting, in the computer, the user log responsive to the monitored user behavior.

16. The computer-implemented method of claim 15, wherein monitoring user behavior comprises at least one selected from the group consisting of:
detecting user input requesting that a selected item be repeated;
detecting user input requesting that a selected item be skipped;
detecting user input specifying a volume change; and
detecting user input specifying that a selected item be muted.

17. The computer-implemented method of claim 1, wherein accepting item selections comprises receiving input provided by a user via an application for playing tracks.

18. The computer-implemented method of claim 1, wherein accepting a query comprises receiving a user log containing identifiers for a user's item selections.

19. The computer-implemented method of claim 1, wherein accepting a query comprises receiving a first search term, the method further comprising:
generating, in the computer, a second search term containing an identifier for each determined result item.

20. The computer-implemented method of claim 19, further comprising at least one of:
providing, in the computer, the second search term as input for a search engine; and
adding, in the computer, the second search term to a searchable portion of a document associated with the first search term.

21. The computer-implemented method of claim 1, further comprising:
periodically uploading the generated log.

22. The computer-implemented method of claim 1, further comprising:
outputting an advertisement relating to the determined at least one result item.

23. The computer-implemented method of claim 22, wherein outputting an advertisement comprises displaying at least one selected from the group consisting of:
a web page;
a banner;
a portion of a web page; and
an animation.

24. The computer-implemented method of claim 1, further comprising:
outputting a notification relating to the determined at least one result item.

25. The computer-implemented method of claim 24, wherein outputting a notification comprises displaying a web page.

26. The computer-implemented method of claim 24, wherein outputting a notification comprises sending a communication to a user.

27. The computer-implemented method of claim 26, wherein sending a communication to a user comprises at least one selected from the group consisting of:
transmitting an electronic mail message to the user;
telephoning the user; and

sending a direct mail item to the user.

28. The computer-implemented method of claim 1, wherein the determined result is responsive to a significance of occurrence of the item in at least a subset of the scored user logs, and wherein the significance is determined by a log likelihood ratio analysis submethod comprising:

determining, in the computer, a total number of user logs N;

determining, in the computer, a number of user logs N_1 in a subset of user logs;

determining, in the computer, a number of user logs N_2 not in the subset of user logs;

determining, in the computer, a number of user logs k_{11} in the subset that include the item;

determining, in the computer, a number of user logs k_{12} not in the subset that include the item;

determining, in the computer, a number of user logs $k_{21} = N_1 - k_{11}$ in the subset that do not include the item;

determining, in the computer, a number of user logs $k_{22} = N_2 - k_{12}$ not in the subset that do not include the item;

and determining, in the computer, a log likelihood ratio for the item.

29. The computer-implemented method of claim 28, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

30. The computer-implemented method of claim 29, further comprising:

adjusting, in the computer, at least one of the k_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a user log;

the logarithm of the number of occurrences of the item in a user log;

the number of occurrences of the item in all user logs;

the logarithm of the total number of users divided by the number of users who have selected the item; and

a normalizing factor.

31. The computer-implemented method of claim 30, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

32. The computer-implemented method of claim 1, further comprising:

deleting, in the computer, from the determined at least one result item any result items already selected by a user associated with the query.

33. The computer-implemented method of claim 1, further comprising:

ranking, in the computer, the at least one result item responsive to a degree of significance.

34. A computer-implemented method of discovering a relationship between a first item and a second item, comprising:

determining, in the computer, a total number of item groups N;

determining, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;

determining, in the computer, a number of item groups N_2 not in the subset of item groups;

determining, in the computer, a number of item groups k_{11} in the subset that contain the first item;

determining, in the computer, a number of item groups k_{12} not in the subset that contain the first item;

determining, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;

determining, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;

determining, in the computer, a log likelihood ratio; and

generating, based on the log likelihood ratio, a representation of the relationship between the first item and the second.

35. The computer-implemented method of claim 34, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

36. The computer-implemented method of claim 35, wherein each item group comprises a document.

37. The computer-implemented method of claim 35, further comprising:

adjusting, in the computer, at least one of the k_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a document;

the logarithm of the number of occurrences of the item in a document;

the number of occurrences of the item in all documents;

the logarithm of the total number of documents divided by the number of documents that include the item; and

a normalizing factor.

38. The computer-implemented method of claim 37, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j represents the number of occurrences of the item in all documents and W_{ij} represents the number of occurrences of the item in a particular document.

39. A system for discovering relationships among items, comprising:
a user interface for accepting item selections from a plurality of users;
at least one log database, coupled to the user interface, for storing a log for each user, each log containing identifiers corresponding to detected user item selections;
a query input device for accepting a query including at least one query item identifier; and
a relationship discovery engine, coupled to the log database and to the query input device, for scoring each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item, and for determining at least one result item, responsive to the scoring of each user log, so as to discover a relationship based exclusively on detected user item selections and the at least one query item.

40. The system of claim 39, wherein the significance of occurrence is determined by a log likelihood ratio analysis and the recommendation engine further determines the at least one result item responsive to the determined significance.

41. The system of claim 39, wherein the significance of occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and wherein the recommendation engine further determines the at least one result item responsive to the determined significance.

42. The system of claim 39, wherein each item is a video track and wherein the user interface accepts item selections by determining which tracks are selected for playback.

43. The system of claim 39, wherein the user interface accepts item selections by determining which tracks are selected for purchase.

44. The system of claim 39, wherein each item is a music track and wherein the user interface accepts item selections by determining which tracks are selected for playback.

45. The system of claim 44, wherein the user interface comprises an online jukebox.

46. The system of claim 45, wherein the online jukebox monitors user behavior with respect to the selected items and adjusts the user log scores responsive to the monitored user behavior.

47. The system of claim 46, wherein the online jukebox monitors user behavior by detecting at least one selected from the group consisting of:
user input requesting that a selected item be repeated; and
user input requesting that a selected item be skipped; and
user input specifying a volume change; and
user input specifying that a selected item be muted.

48. The system of claim 47, further comprising:
a track list generator, coupled to the recommendation engine, for generating a track list containing an identifier for each determined result item comprising a music track.

49. The system of claim 44, further comprising:
a music player, coupled to the track list generator, for playing the music tracks specified by the generated track list.

50. The system of claim 44, further comprising:

a format scheduler, for accepting a format schedule specifying music track categories for time periods; and

a track list generator, coupled to the recommendation engine and to the format scheduler, for generating a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

51. The system of claim 39, wherein the query input device receives a user log containing identifiers for a user's item selections.

52. The system of claim 39, wherein the query input device receives a first search term, the system further comprising:

a search term generator, coupled to the recommendation engine, for generating a second search term containing an identifier for each determined result item and for providing the second search term as input for a search engine.

53. The system of claim 39, wherein the query input device receives a first search term, the system further comprising:

a search term generator, coupled to the recommendation engine, for generating a second search term containing an identifier for each determined result item and for providing the second search term to be added to a searchable portion of a document associated with the first search term.

54. The system of claim 39, further comprising:

an advertisement output device, coupled to the recommendation engine, for outputting an advertisement relating to the determined at least one result item.

55. The system of claim 54, wherein the advertisement output device displays at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

56. The system of claim 39, further comprising:

a notification output, coupled to the recommendation engine, for outputting a notification relating to the determined at least one result item.

57. The system of claim 56, wherein the notification output device displays at least one selected from the group consisting of:

a web page;

a banner;

a portion of a web page; and

an animation.

58. The system of claim 56, wherein the notification output device sends a communication to a user.

59. A computer-readable medium comprising computer-readable code for discovering relationships between items, comprising:

computer-readable code adapted to accept item selections detected from a plurality of users;

computer-readable code adapted to generate a log for each user, each log containing identifiers corresponding to detected user item selections;

computer-readable code adapted to accept a query including at least one query item identifier;

computer-readable code adapted to score each of the user logs, the scoring for each user log being responsive to a frequency of occurrence of the at least one query item identifier in the user log, a frequency of occurrence of the at least one query item identifier in all of the user logs and a query weight for the at least one query item identifier in the query, so as to generate a user log score for each user log based exclusively on detected user item selections and the at least one query item;

computer-readable code adapted to determine at least one result item, responsive to the scoring of each user log, so as to discover a relationship based exclusively on detected user item selections and the at least one query item.

60. The computer-readable medium of claim 59, wherein a significance of occurrence is determined by a log likelihood ratio analysis and the determined result is further responsive to the determined significance.

61. The computer-readable medium of claim 59, wherein a significance of occurrence is determined by a substantial equivalent of a log likelihood ratio analysis and the determined result is further responsive to the determined significance.

62. The computer-readable medium of claim 59, wherein each item is a video track and wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to determine which tracks are selected for playback.

63. The computer-readable medium of claim 59, wherein each item is a music track and wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to determine which tracks are selected for playback.

64. The computer-readable medium of claim 63, further comprising:
computer-readable code adapted to generate a track list containing an identifier for each determined result item comprising a music track.

65. The computer-readable medium of claim 64, further comprising:
computer-readable code adapted to delete from the track list at least one identifier corresponding to a music track already selected by the user.

66. The computer-readable medium of claim 64, further comprising:
computer-readable code adapted to play the music tracks specified by the generated track list.

67. The computer-readable medium of claim 63, further comprising:
computer-readable code adapted to accept a format schedule specifying music track categories for time periods; and
computer-readable code adapted to generate a track list conforming to the format schedule and containing an identifier for each determined result item comprising a music track.

68. The computer-readable medium of claim 63, wherein the computer-readable code adapted to score the user logs comprises computer-readable code adapted to determine a frequency of occurrence in each user log of at least one music track identified by the query item identifier.

69. The computer-readable medium of claim 63, wherein the computer-readable code adapted to score the user logs comprises computer-readable code adapted to determine a frequency of occurrence in each user log of at least one music track associated with an artist identified by the query item identifier.

70. The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input provided by a user via a web page.

71. The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input specifying an item purchase by a user.

72. The computer-readable medium of claim 59, further comprising, computer-readable code adapted to, prior to determine the at least one result item, define a subset of the scored user logs responsive to the user log scores, the at least one result item being determined from the subset of scored user logs.

73. The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to monitor user behavior with respect to the selected items; and
computer-readable code adapted to adjust the user log scores responsive to the monitored user behavior.

74. The computer-readable medium of claim 73, wherein the computer-readable code adapted to monitor user behavior comprises at least one selected from the group consisting of:
computer-readable code adapted to detect user input requesting that a selected item be repeated;
computer-readable code adapted to detect user input requesting that a selected item be skipped;
computer-readable code adapted to detect user input specifying a volume change; and
computer-readable code adapted to detect user input specifying that a selected item be muted.

75. The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept item selections comprises computer-readable code adapted to receive input provided by a user via an application for playing tracks.

76. The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept a query comprises computer-readable code adapted to receive a user log containing identifiers for a user's item selections.

77. The computer-readable medium of claim 59, wherein the computer-readable code adapted to accept a query comprises computer-readable code adapted to receive a first search term, the computer-readable medium further comprising:
computer-readable code adapted to generate a second search term containing an identifier for each determined result item.

78. The computer-readable medium of claim 77, further comprising at least one of:
computer-readable code adapted to provide the second search term as input for a search engine; and
computer-readable code adapted to add the second search term to a searchable portion of a document associated with the first search term.

79. The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to periodically upload the generated log.

80. The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to output an advertisement relating to the determined at least one result item.

81. The computer-readable medium of claim 80, wherein the computer-readable code adapted to output an advertisement comprises computer-readable code adapted to display at least one selected from the group consisting of:
a web page;
a banner;
a portion of a web page; and
an animation.

82. The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to output a notification relating to the determined at least one result item.

83. The computer-readable medium of claim 82, wherein the computer-readable code adapted to output a notification comprises computer-readable code adapted to display a web page.

84. The computer-readable medium of claim 82, wherein the computer-readable code adapted to output a notification comprises computer-readable code adapted to send a communication to a user.

85. The computer-readable medium of claim 84, wherein the computer-readable code adapted to send a communication to a user comprises at least one selected from the group consisting of:
computer-readable code adapted to transmit an electronic mail message to the user;
computer-readable code adapted to telephone the user; and
computer-readable code adapted to send a direct mail item to the user.

86. The computer-readable medium of claim 59, wherein the determined result is responsive to a significance of the occurrence of the item in at least a subset of the scored user logs, and wherein the computer-readable code adapted to determine a determined at least one result item comprises computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod.

87. The computer-readable medium of claim 86, wherein the computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod comprises:
computer-readable code adapted to determine a total number of users N;
computer-readable code adapted to determine a number of users N_1 in a subset of users;
computer-readable code adapted to determine a number of users N_2 not in the subset of users;
computer-readable code adapted to determine a number of users k_{11} in the subset that selected the item;
computer-readable code adapted to determine a number of users k_{12} not in the subset that selected the item;
computer-readable code adapted to determine a number of users $k_{21} = N_1 - k_{11}$ in the subset that did not select the item;
computer-readable code adapted to determine a number of users $k_{22} = N_2 - k_{12}$ not in the subset that did not select the item; and

computer-readable code adapted to determine a log likelihood ratio for the item.

88. The computer-readable medium of claim 87, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

89. The computer-readable medium of claim 86, wherein the computer-readable code adapted to determine the result by a log likelihood ratio analysis submethod further comprises:

computer-readable code adapted to adjust at least one of the n_{ij} values responsive to at least one selected from the group consisting of:

the number of occurrences of the item in a user log;

the logarithm of the number of occurrences of the item in a user log;

the number of occurrences of the item in all user logs;

the logarithm of the total number of users divided by the number of users who have selected the item; and

a normalizing factor.

90. The computer-readable medium of claim 89, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j is a weight based on the number of occurrences of the item in all user logs and W_{ij} is a weight based on the number of occurrences of the item in a particular user log.

91. The computer-readable medium of claim 59, further comprising:

computer-readable code adapted to delete from the determined at least one result item any result items already selected by a user associated with the query.

92. The computer-readable medium of claim 59, further comprising:
computer-readable code adapted to rank the at least one result item responsive to a degree of significance.

93. A computer-readable medium comprising computer-readable code for discovering a relationship between a first item and a second item, comprising:
computer-readable code adapted to determine, in a computer, a total number of item groups N;
computer-readable code adapted to determine, in the computer, a number of item groups N_1 in a subset of item groups, the subset of item groups being defined as including those item groups that contain a second item;
computer-readable code adapted to determine, in the computer, a number of item groups N_2 not in the subset of item groups;
computer-readable code adapted to determine, in the computer, a number of item groups k_{11} in the subset that contain the first item;
computer-readable code adapted to determine, in the computer, a number of item groups k_{12} not in the subset that contain the first item;
computer-readable code adapted to determine, in the computer, a number of item groups $k_{21} = N_1 - k_{11}$ in the subset that do not contain the first item;
computer-readable code adapted to determine, in the computer, a number of item groups $k_{22} = N_2 - k_{12}$ not in the subset that do not contain the first item;
computer-readable code adapted to determine, in the computer, a log likelihood ratio; and
computer-readable code adapted to generate, based on the log likelihood ratio, a representation of the relationship between the first item and the second item.

94. The computer-readable medium of claim 93, wherein the log likelihood ratio is defined as:

$$\sum k_{ij} \log \frac{\pi_{ij}}{\mu_j}$$

where: $\pi_{ij} = \frac{k_{ij}}{N_j}, \mu_j = \sum_i \frac{k_{ij}}{N}$.

95. The computer-readable medium of claim 93, wherein each item group comprises a document.

96. The computer-readable medium of claim 93, further comprising:
computer-readable code adapted to adjust, in the computer, at least one of the k_{ij} values
responsive to at least one selected from the group consisting of:
the number of occurrences of the item in a document;
the logarithm of the number of occurrences of the item in a document;
the number of occurrences of the item in all documents;
the logarithm of the total number of documents divided by the number of documents that include the item; and
a normalizing factor.

97. The computer-readable medium of claim 96, wherein the normalizing factor is $\frac{1}{\sqrt{\sum (S_j W_{ij})^2}}$, where S_j represents the number of occurrences of the item in all documents and W_{ij} represents the number of occurrences of the item in a particular document.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

No decisions have been rendered by a court or the Board of Patent Appeals and Interferences in any proceeding identified herein pursuant to 37 CFR § 41.37(c)(1)(ii).